PHYSICS ABSTRACTS

BEING

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ABSTRACTS 323–515
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MATHEMATICS

323 513.712.3

On a generalization of Thomsen's triangle in a web. CHOUDHURY, A. C. *Bull. Calcutta Math. Soc.*, 34, *pp.* 93–98, *June*, 1942.—It is shown that a web gives a geometrical picture of a quasigroup. Some new closed figures which are generalizations of a Thomsen's triangle are also given and it is shown that these figures lead to some associative commutative laws.

324 517.397.1 : 517.521

Some asymptotic relations. BATEMAN, H. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 371–374, *Sept.*, 1942.

325 517.5

Two notes on inequalities. ZYGMUND, A. *J. Math. Phys.*, 21, *pp.* 117–123, *Aug.*, 1942.

326 517.512

Quadratic convolution equations. CAMERON, R. H. *J. Math. Phys.*, 21, *pp.* 57–62, *Aug.*, 1942.

327 517.512

Some remarks concerning the coefficients of schlicht functions. SPENCER, D. C. *J. Math. Phys.*, 21, *pp.* 63–68, *Aug.*, 1942.

328 517.512

On singular monotonic functions of the Cantor type. SALEM, R. *J. Math. Phys.*, 21, *pp.* 69–82, *Aug.*, 1942.—A study of the Fourier–Stieltjes coeff. of continuous singular monotone functions of the Cantor type, const. in each interval contiguous to a perfect set of measure zero.

See Abstr. 451 517.512.2 : 548.1

See Abstr. 324 517.521 : 517.397.1

329 517.6

On an integral involving Laguerre functions. SHABDE, N. G. *Bull. Calcutta Math. Soc.*, 34, *pp.* 53–54, *June*, 1942.

330 517.65

Infinite integrals involving Struve's functions (III). MOHAN, B. *Bull. Calcutta Math. Soc.*, 34, *pp.* 55–59, *June*, 1942.

331 517.65

Some infinite integrals. SINHA, S. *Bull. Calcutta Math. Soc.*, 34, *pp.* 67–77, *June*, 1942.

332 517.65

Two inversion formulae. RAO, D. V. B. *Bull. Calcutta Math. Soc.*, 34, *pp.* 79–85, *June*, 1942.

333 517.942.62

An orthogonal property of the hypergeometric polynomial. BATEMAN, H. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 374–377, *Sept.*, 1942.

334 517.947.5 : 530.145.6

A note on meson wave. SEN, N. R. *Bull. Calcutta Math. Soc.*, 34, *pp.* 61–65, *June*, 1942.—The fundamental equation admits of a transformation by which the action at a point can be made to appear wholly as a purely retarded effect of electromagnetic-wave type.

335 519.241.5 : 519.271.3

On the sampling distribution of harmonic means. VALI, M. A. *Bull. Calcutta Math. Soc.*, 34, *pp.* 87–91, *June*, 1942.

336 519.264.4

Contingency tables. WILSON, E. B., AND WORCESTER, J. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 378–390, *Sept.*, 1942.

See Abstr. 335 519.271.3 : 519.241.5

337 519.45

Automorphisms of the dihedral groups. MILLER, G. A. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 368–371, *Sept.*, 1942.

ASTRONOMY

338 522.78

New projector for navigation stars. BENFORD, J. R. *Sky and Telescope*, 2, *pp.* 3–4, *Nov.*, 1942.—The artificial star projector is located in the centre of a hemispherical dome, upon which it projects images corresponding to 145 navigational stars.

339 523.73

Remarks on the rotation of a magnetized sphere with application to solar rotation. ALFVÉN, H. *Ark. Mat. Astr. Fys.*, 28 *A*, 6, [9 *pp*], 1941.—If a cloud of ions is initially at rest near a rotating magnetized conducting sphere, a current system is produced which accelerates the ions and retards the rotation until the angular velocities are equalized. The effect may be important in the solar rotation, particularly as the retardation of the rotation should be strongest at high lat. That the sun does in fact rotate more slowly near its poles is attributed to a mechanism of this kind; there may be a continuous inflow of ionized gas from interstellar space, or there may have been such an inflow when the planets were formed, and viscosity has not yet equalized the zonal rotations.

A. HU.

340 523.746

Provisional sunspot-numbers for April to June, 1942. BRUNNER, W. *Terr. Magn. Atmos. Elect.*, 47, *p.* 194, *Sept.*, 1942.

See Abstr. 465 523.746 : 550.384

341 523.752 = 3

Flow of matter in solar prominences. I. A new law of motion. WALDMEIER, M. *Z. Astrophys.*, 21, 3, *pp.* 130–141, 1942.—Measurements are made on a series of photographs of an active prominence taken on 28 Dec., 1940, with the Arosa coronagraph. This prominence showed 32 well-defined knots of which the positions could be measured to 1 sec. of arc, and which are traced on 40 exposures taken at intervals of 1 min. They appeared apparently from nothing at a height of about 10^5 km. in the upper chromosphere, and moved downwards to 2 centres of attraction on the solar surface. The projected trajectories are not continuous, but made up of sep. straight lines. The alterations of direction are often, but not always, accompanied by sudden changes of velocity already noted in prominences of this kind; but these latter do not follow Pettit's integral-multiple law. The spatial and temporal distribution of the points where changes of direction occur are discussed, with special ref. to knots following successively the same trajectory, and to knots which divide into 2 parts.

A. HU.

342 523.77

Photometric study of the profiles of the Fraunhofer lines in the solar spectrum. I. Mg b. group. RAO, Y. P., AND ANANTHASUBRAHMANYAM, C. K. *Indian J. Phys.*, 16, *pp.* 177–186, *June*, 1942.—Results of photometric studies during the last year. After a brief description of the improvements and refinements perfected in the direct-reading photo-electric spectrophotometer [Abstr. 1298 (1941)], the use of the instrument is discussed.

343 523.775.5

The nature of the solar corona. PETRIE, W. *J. Roy. Astr. Soc. Can.*, 36, *pp.* 312–316, *Sept.*, 1942.—The author reviews attempts to identify the atoms responsible for the line spectrum of the solar corona, and concludes that Edlén's theory [Abstr. 344 (1943)] is the most likely yet put forward. Against it, however, are the observed doubling of 5 303 Å, believed to be due to self-reversal, which cannot occur with forbidden lines; and the absence of highly ionized Ti. Twelve new coronal lines obtained by Menzel and the author at the 1936 eclipse are not yet identified, but investigation of other highly ionized atoms may reveal their origin. A. HU.

344 523.775.5

An attempt to identify the emission lines in the spectrum of the solar corona. EDLÉN, B. *Ark. Mat. Astr. Fys.*, 28 *B*, 1, [4 *pp.*], 1941.—From unpublished measurements in the extreme ultra-violet spectra of highly ionized atoms of Fe and Ca, and by predicting by extrapolation term separations in other ions, the author identifies 15 coronal lines from the ultra-violet to the infra-red, including all the strongest ones. The lines at 6 374 Å and 7 892 Å are attributed to forbidden transitions in the ground states of Fe X and Fe XI, respectively, whilst 3 328 Å and 4 086 Å are due to similar transitions in Ca XII and Ca XIII. Thence by extrapolation the strongest line at 5 303 Å is attributed to Fe XIV, and the 3 next strongest to Fe XIII. The extrapolated Fe XII transitions are unobservable, whilst neighbouring Fe ions have no deep metastable levels. Corresp. transitions in Ni account for 6 more observed lines. The ionization potentials involved range from 233 V to 655 V, the max. ion abundance occurring at about 400 V. The elements K, Cr, Mn and Co, which should give observable lines, are not represented, thus suggesting a parallel between coronal matter and meteoritic matter, rather than betw. the corona and the general solar atmosphere. A. HU.

See Abstr. 480 523.78 : 551.5

345 526.7 : 536.581.2

Problems in temperature control of gravimeters. CLEWELL, D. H. *Geophysics*, 7, *pp.* 155–168, *April*, 1942.—The theoretical considerations entering into the design of thermostatically controlled ovens for gravimeters are presented. To obtain the most uniform temperature distribution without excessive amounts of material, plural thermostat control points on the heater element are desirable. It is recommended that dual thermostating be employed in which an inner controlled shell is surrounded by an outer thermostated layer held at an approx. const. temperature several deg. lower than the temperature of the inner shell.

346 526.75

A re-examination of the Potsdam absolute determination of gravity. DRYDEN, H. L. *J. Res. Nat. Bur. Stand., Wash.*, 29, *pp.* 303–314, *Nov.*, 1942.—Recent abs. determinations differ from the accepted Potsdam value by amounts $>$ the probable error assigned to that value by the Potsdam investigators. The discrepancy is due in large part to an adjustment made with the intent of correcting for certain systematic errors. The adjustment was probably not warranted. If this adjustment is not made, the Potsdam result is about 12 p.p.m. less than the commonly accepted value as compared with 14 and 20 p.p.m. less as found in the recent abs. determinations. The best value of g is probably obtained by reducing the local value in the Potsdam system by about 15 p.p.m.

PHYSICS: GENERAL

347 53(083)

Some notes and suggestions on the teaching of physics. SMITH, C. J. *Phil. Mag.*, 33, *pp.* 775–815, *Nov.*, 1942.—A plea is made for greater exactness in defining physical quantities and for greater attention to the correct use of algebraic signs. Examples are cited to illustrate some of the points raised. Several well-known experiments have been improved.

348 53.081.5

Notes on dimensions. WILSON, W. *Phil. Mag.*, 33, *pp.* 842–844, *Nov.*, 1942.—A criticism [see Abstr. 41 (1943)].

349 530.12

Axiomatic treatment of kinematical relativity. MCVITTIE, G. C. *Proc. Roy. Soc. Edinb. A*, 61, 3, *pp.* 210–222, 1942.—An analysis of Milne's kinematical relativity is given. The method is to state 9 axioms, 8 of which are definitions of co-ordinates of velocity and acceleration, and of the regraduation of clocks; the 9th defines equivalent observers. These axioms are the effective basis of the theory in so far as it deals with the motions of light rays and of individual observers in the line of sight of a given observer. The physical interpretation of the theory is discussed.

350 530.12

The problem of the rotating disc. BERENDA, C. W. *Phys. Rev.*, 62, *pp.* 280–290, *Sept.* 1 *and* 15, 1942.—The spatial geometry of the surface of a rotating disc is examined from the standpoint of general relativity theory. Eddington's argument for a homaloidal surface is shown to be in error, and Einstein's relative geometry is correlated with the intrinsic geometry of the disc. The temporal aspects of the rotating disc are examined and a new test of general relativity, by use of the cyclotron, is proposed.

See Abstr. 353 530.12 : 531.113

351 530.145 : 530.162

Probability and quantum theory. JEFFREYS, H. *Phil. Mag.*, 33, *pp.* 815–831, *Nov.*, 1942.—The identification of the $\psi\psi$ of wave mechanics, when it involves the time, with a probability distribution, is found to be equivalent to a generalization in probability language of the principles of the relativity of time and the reversibility of path. Either hypothesis leads to the result that strictly cyclic changes occur, and definite orbits are as much a consequence of quantum theory

of classical theory. Neither leaves any room for dom transitions, which it is one of the main ects of quantum theory to treat. It is suggested t the difficulty may be avoided by a limitation of scope of the principle of reversibility.

See Abstr. 334 530.145.6 : 517.947.5

See Abstr. 351 530.162 : 530.145

See Abstr. 369 530.162 : 534.647

352 530.162 = 3

Reversible motions of liquids and gases. MEIXNER, *Ann. Phys., Lpz.*, 41, 6, *pp.* 409–425, 1942.—For uids and gases with one component and for mix- es of 2 ideal gases the possibility is investigated of ersible processes which run down with finite velo- y. Disappearance of energy dissipation, otherwise ropy creation, is postulated as the condition for reversibility. Two groups of solutions of the uations of motion arise: (1) The liquid or gas oves as a rigid body. The motion can be com- unded of a translation with const. acceleration and rotation with const. ang. vel. As the system is at t for an observer moving with it and it experiences internal changes, there is a masked thermo- namic equilibrium in this case. (2) Internal iabatic changes occur in the system (density and mperature changes). In general, there is only simple motion of this kind, i.e. a radial expansion contraction. There is, however, a class of equa- ons of state, including the equation of state of the al gas with const. sp. ht., for which more general versible motions are possible. They also occur r mixtures of ideal gases. For gases and liquids th one component the free energy is given. The kart criteria [Abstr. 2819 (1940)] for thermo- namic equilibrium, which they define from the versible processes, are examined in their relation the condition of vanishing energy dissipation. ie conclusion is that all masked thermodynamic uilibria are not covered by them. H. G. S.

353 531.113 : 530.12

On "absolute acceleration." MILNE, E. A. *Nature, ond.*, 150, *p.* 489, *Oct.* 24, 1942.

354 531.258

Stresses in an infinite strip due to an isolated couple cting at a point inside it. SEN, B. *Bull. Calcutta Math. Soc.*, 34, *pp.* 45–51, *June*, 1942.—The couple ssumed is such as could be produced by tightening p a nut on a bolt passing through the plate, the late resisting the couple.

355 531.66

Graphical analysis of impact of elastic bars. DEJUHASZ, K. J. *J. Appl. Mech.*, 9, *A*122–*A*128, *ept.*, 1942.—A method of graphical dynamics is pplied to obtain the change of state in every cross- ection of an elastic bar for every instant of time. It tails the use of 2 diagrams, (1) time/distance, (t/x), nd (2) velocity/stress, (v/p). From these are derived ie functions: $v = f_1(t,x)$ and $p = f_2(t,x)$, which can e represented by a pair of tri-dimensional stereo- rams that describe completely the change of velocity nd of stress in the elastic bar. After detailing the acts which characterize impact of elastic bars, xamples are worked out and the stereograms drawn. n the case of impact of a short moving bar against a ong bar at rest, the graphical method gives a different result from the mathematical method for the elastic impact of point masses, since the former case takes account of energy stored in the form of travelling waves. G. E. A.

See Abstr. 371 531.717.1 : 535.24

356 531.717.1 : 621.317.49 : 621.317.39 = 2 = 82

Electromagnetic apparatus for fault-finding and for thickness of non-magnetic coatings. ENTIN, S. D. *Sheet Metal Industr.*, 16, *pp.* 1326–1328, *Sept.*, 1942. *J. Mater. Test., U.S.S.R.*, 10, *pp.* 126–190, *Feb.*, 1942.—[Abstr. 325 B (1943)].

357 531.73 : 539.215

Apparatus for particle-size analysis. *Engineering*, 154, *pp.* 141–142, *Aug.* 21; 181–182, *Sept.* 4; 221–223, *Sept.* 18, *and pp.* 241–242, *Sept.* 25, 1942.—Comprehensive research led to a precision sedimentation method of measurement of particles of sizes from 2–100 μ, such as is required in explosives, milling, fertilizers, etc. The tracks of the test particles falling in a stagnant liquid under gravity are photographed and the length of track, for a given exposure, is a measure of its falling speed, and from Stokes's law the dia. can be calculated. Necessary precautions are given, with the theoretical calculations and typical results. Other methods investigated include microscopic measurement, the best for particles from 0·3–10 μ; elutrition, suitable for 10–80 μ. A turbidimeter is regarded as promising for further work, likely to serve down to $< 1\ \mu$. E. H. W. B.

358 531.732 : 621.317.39

Electric determination of film volume and film density. LÖWY, H. *Phil. Mag.*, 33, *pp.* 772–774, *Oct.*, 1942.—[Abstr. 326 B (1943)].

359 532.13 : 541.182.4 = 3

Viscosity of emulsions of highly viscous substances as a function of concentration. EILERS, H. *Kolloid Z.*, 97, *pp.* 313–321, *Dec.*, 1941.—Formulae [Abstr. 386 (1942)] are discussed and compared with the results of experiments on emulsions of highly viscous hydrocarbons. Considering the packing and homogeneity of the particles, a different formula is derived, which agrees with exp. results. R. N.

360 532.13 : 541.182.5 = 3

Viscosity and structure of hydrophile colloids. II. ROSSI, C. *Kolloid Z.*, 97, *pp.* 304–313, *Dec.*, 1941.—[See Abstr. 1406 (1942)]. Measurements of internal friction at different speeds were made on paraffin oil emulsions of different conc. and on commercial bitumen emulsions. The influence of *p*H, of deg. of dispersity and of conc., was investigated. An equation is derived for friction coeff. *v.* speed. R. N.

361 532.613.4.08 = 3

Absolute determination of surface and interfacial tensions by the drop-weight method. DUNKEN, H. *Ann. Phys., Lpz.*, 41, 7–8, *pp.* 567–583, 1942.—The application of the falling-drop theory to Hg drops from glass capillaries dipping into the liquid is investigated for a limited range of the capillary radius, and the theory is confirmed. The Harkins correction factors [Abstr. 674 (1919)] are valid for Hg and can be directly computed from the theory. The falling drop is weighed and the size of the drop remainder determined from its contour from photographs. The drop remainders are always semi-spherical in shape

and their weights are thus readily calculated. The weights of Hg falling drops in benzole, cyclohexane and cethane, for different capillary radii, are tabulated. The interfacial tensions of Hg against these liquids are given and compared with the values calculated according to Harkins. They are in good agreement. H. G. S.

362 532.696.2 : 676

Surface wettability of paper (angle-of-contact method): TAPPI suggested method. *Paper Tr. J.*, 115, *pp.* 31–32, *Sept.* 3, 1942.—Object of method is quantitative determination of resistance of paper surfaces to wetting; it is useful for determination of writing and ruling qualities of papers as well as for other problems related to resistance which the surface of paper offers to water and aqueous vehicles; the method deals with behaviour of drops of water, or aqueous solution, when applied directly to the surface. Bibliography. E. R. A.

363 532.77 : 536.7 = 3

Formation of swarms of dipoles in solutions. HARTMANN, H. *Z. phys. Chem. B*, 51, *pp.* 309–318, *July*, 1942.—With a few simplifying assumptions the formation of swarms of dipoles is calculated for solutions of polar substances in non-polar solvents. The calculations are similar to those used in the theory of strong electrolytes and refer only to those solutions for which the molar polarization varies in a monotone curve with concentration. The calculations serve for determining the thermodynamic properties of these solutions, especially the additional electrostatic term of the free enthalpy of the solution and the deviations of f.p. depression and of b.p. elevation from normal. R. N.

364 533.24

A non-fouling hydrogen liquefier. BLANCHARD, E. R., AND BITTNER, H. W. *Rev. Sci. Instrum.*, 13, *pp.* 394–405, *Sept.*, 1942.—A description is given of: (*a*) the construction and operation of a complete throttle expansion H liquefaction cycle employing the Kapitza circuit for operation with ordinary commercial gas; (*b*) a simple scheme for employing dry ice as a supplementary precooling agent; (*c*) a satisfactory method of soldering together a Kapitza side-by-side multiple tube interchanger; (*d*) an efficient and easily built combination heat exchanger and trap for freezing out water and oil vapour from large, rapid streams of compressed gas.

See Abstr. 375 533.6.01 : 535.314

SOUND. VIBRATIONS

365 534.222.2

The production of elastic waves by explosion pressures. I. Theory and empirical field observations. SHARPE, J. A. *Geophysics*, 7, *pp.* 144–154, *April*, 1942.—A solution to the problem of the wave motion produced when a pressure of arbitrary form is applied to the interior surface of a spherical cavity in an ideally elastic medium is derived. This solution is shown to be in qualitative agreement with a number of field observations of the effect of shot-point conditions on the characteristics of reflection seismograph recordings.

366 534.24

On the reflection of a spherical sound pulse by a parabolic mirror. FRIEDLANDER, F. G. *Proc. Camb. Phil. Soc.*, 38, *pp.* 383–393, *Oct.*, 1942.—An application of a simple series solution of the wave equation to the reflection by a paraboloid of revolution of a sound pulse coming from the focus of the reflector. Numerical results indicate that the convergence of the series is unsatisfactory except near the vertex of the mirror. The first 7 coeff. of the series have been calculated, and investigation of the reflection of the simple rectangular pulse reveals that after some time a secondary pressure max. is established at some distance from the axis. The results apply, to a certain extent, to a finite parabolic mirror. G. E. A.

367 534.26 = 3

The dispersion and absorption of sound in clouds. OSWATITSCH, K. *Phys. Z.*, 42, 21–22, *pp.* 365–378, 1941.—A theoretical investigation of the effect on the propagation of sound of the condensation or evaporation of water drops suspended in the atmosphere. At sufficiently low sound frequencies, condensation or evaporation of water vapour in clouds or fog can occur in appreciable quantity, leading to absorption and dispersion phenomena. Whereas in clouds the dispersion region is always below the range of human audibility, in clouds laden with water in small drops the absorption region extends into the range of the deep audible tones, in agreement with the known strong absorption of thunder. H. G. S.

368 534.647

Interpretation of the transient behaviour of the reflection seismograph. PIETY, R. G. *Geophysics*, 7, *pp.* 123–132, *April*, 1942.—Discusses a method of design for the reflection seismograph based on the galvanometer response when the geophone is subject to a unit impulse. A graphical method of obtaining the actual response to an arbitrary geophone motion in terms of the impulsive response is given. A family of desirable types of impulsive response is obtained by analysing the implications of this graphical computation when strong l.f. and h.f. interference is present. The application to the evaluation of corrections in the apparent arrival time of reflections obtained with different instruments is outlined.

369 534.647 : 530.162

The limiting sensitivity of seismic detectors. WOLF, A. *Geophysics*, 7, *pp.* 115–122, *April*, 1942.—The theory of Brownian motion is applied to the problem of determination of the limiting sensitivity of seismic detectors. A certain min. suspended mass is required for the recording of small ground motions. Electromagnetic geophones are studied in detail, and it is shown how spontaneous thermal fluctuations in voltage limit the performance of these instruments. Under certain conditions, a geophone may be treated as a power generator, and the necessary suspended mass is then determined by the power requirements of the recording apparatus.

370 534.837 : 621.314.2

Transformers are loud—only if you hear them. FAHNOE, H. *Westinghouse Engr*, 2, *pp.* 55–57, *May*, 1942.—[Abstr. 261 B (1943)].

OPTICS

371 535.24 : 531.717.1

Photometric measurement of galvanized coatings. LAUENSTEIN, A. *Iron Coal Tr. Rev.*, 145, *p.* 703,

Aug. 28, 1942.—Description of application of the quantitative spectro-analytical method to measurement of thickness of galvanized coatings; effort is made to eliminate sources of error by using photometer for analysing spectra obtained; while photometric measurements enable small variations in intensity to be measured, when calculating coating thickness, current technique is still too crude and calls for much refinement. E. R. A.

372 535.241.3 = 3

The ratio of international c.p. to the new c.p. GEISS, W. *Bull. Ass. Suisse Élect.*, 33, *pp.* 395–396, *July* 15, 1942.

373 535.241.44 : 628.97

Illumination from arrays of rectangular sources. SPENCER, D. E. *J. Opt. Soc. Amer.*, 32, *pp.* 539–551, *Sept.*, 1942.—[Abstr. 450 B (1943)].

374 535.247.4

Photo-electric densitometer. *Rev. Sci. Instrum.*, 13, p. 406, *Sept.*, 1942.

See Abstr. 398 535.3 : 537.531

375 535.314 : 533.6.01

The influence of an uneven anisotropy on the path of light rays. FRANK, P. *Phys. Rev.*, 62, *pp.* 241–243, *Sept.* 1 *and* 15, 1942.—The refr. index of a medium may be $\mu(\mathbf{r}, \mathbf{s}) = \mu_0(\mathbf{r}) + \mu_1(\mathbf{r}, \mathbf{s})$, the vector $\mathbf{r}$ denoting the co-ordinates of a point and the unit vector $\mathbf{s}$ the direction of the ray, while μ_1 may be any function of $\mathbf{s}$. The deflection of a ray pencil $\mathbf{s} = \mathbf{s}(\mathbf{r})$ by the anisotropy μ_1 is defined by the curvature vector $\mathbf{k}$ of the deflected rays rel. to the rays in the isotropic medium μ_0. Applications to anisotropy produced by stationary motion and to the influence of wind upon the optimum path of an aeroplane are discussed.

376 535.33.03 = 3

Fundamentals in the excitation of organic molecules by electron collision in the glow discharge. SCHÜLER, H., AND WOELDIKE, A. *Phys. Z.*, 42, 23–24, *pp.* 390–399, 1941.—[See Abstr. 1577 (1941)]. It is shown how to obtain pure emission spectra of non-dissociated organic molecules, and experimental conditions are described for obtaining spectra of the products of dissociation. The conditions are discussed in connection with benzene. Results are also given for benzene nitrile, chlorbenzene and benzene bromide. The emission and absorption spectra are not identical. The excitation by electron collision of organic substances thus gives rise to a new spectroscopic method of investigation. The comparison of emission and absorption affords a means of deciding the position and form of the potential curves of organic molecules in the excited and the non-excited state. Results with ketones lead to the conclusion that there is a strengthening of the bond in the excited molecular state. H. G. S.

377 535.338.3

Absorption phenomena in a condensed spark source. LANGSTROTH, G. O., AND BROWN, W. W. *Canad. J. Res. A*, 20, *pp.* 173–183, *Oct.*, 1942.—Intensity ratios of certain line pairs in the spectrum of Mg, of Hg and of Sn, depend on the amount of the element introduced into the source, even when the amount is within the range dealt with in making trace analyses. Line pairs involving transitions to a level in the ground term and to a considerably higher level exhibited this behaviour. It is attributed to partial absorption, mainly within the limits of the discharge. The dependence of the intensity ratios on the amount of the element present was not affected appreciably by air currents of 80 cm./sec. velocity; it was affected by currents of 1 500 cm./sec. velocity. The effects are normally stable.

378 535.338.4

On the $^2\Pi_u \rightarrow {}^2\Pi_g$ bands of CO_2^+. II. MROZOWSKI, S. *Phys. Rev.*, 62, *pp.* 270–279, *Sept.* 1 *and* 15, 1942.—[See Abstr. 436 (1942)]. 24 new subbands were analysed. These belong to the progressions $v_2'' = 1$ and $v_2'' = 2$. The substate $^2\Pi_{3/2g}$, $v_2'' = 1$ is split into 2 levels, the splitting being probably caused by an interaction with some other unidentified substate. Weaker perturbations, Λ-doubling and shifts of vibrational levels, were detected in other vibrational levels. A selection rule forbidding transitions between vibrational levels showing opposite perturbation shifts in the vibrational energy has been found.

379 535.361.2

Fresnel reflection of diffusely incident light. JUDD, D. B. *J. Res. Nat. Bur. Stand., Wash.*, 29, *pp.* 329–332, *Nov.*, 1942.—The reflection factor of a plane boundary between 2 media has been computed by the Fresnel formula for unpolarized, perfectly diffused incident light as a function of the rel. ind. of refr.

See Abstr. 399, 400 535.4 : 537.531

See Abstr. 451 535.683 : 539.181 : 548

380 535.767

Shape of subjective space. WALKDEN, S. L. *Nature, Lond.*, 150, *p.* 662, *Dec.* 5, 1942.—[See Abstr. 151 (1943)].

HEAT. THERMODYNAMICS

381 536.212

Heat flow in the region bounded internally by a circular cylinder. JAEGER, J. C. *Proc. Roy. Soc. Edinb. A*, 61, 3, *pp.* 223–228, 1942.—The paper gives numerical results for the cooling of the region bounded internally by a circular cylinder, with const. initial temperature, and various boundary conditions at the surface.

382 536.212.3.08 : 679.5 = 3

Testing equipment for determining heat conductivity of plastics. KOCH, W. *Kunststoffe*, 31, *pp.* 135–138, *April*, 1941.—Illustrated description of easily handled, automatically regulated apparatus. E. R. A.

383 536.221

Thermal conductivity of liquid metals. RAO, M. R. *Indian J. Phys.*, 16, *pp.* 155–167, *June*, 1942.—The abrupt decrease in the thermal conductivity of metals near the m.p. is explained on the assumption that the frequency of vibration of molecules suffers a change near the m.p. The ratio of thermal conductivities in the solid and liquid phases near the m.p. is $e^{2\lambda_m/3K_0T_m}$ where K_0 is the Boltzman const. and λ_m/T_m the entropy of melting. The slight decrease in thermal conductivity in the liquid phase is ascribed to the disordered state in the liquid.

384 536.413 = 3

Studies of the thermal expansion of solids at low temperatures. III. (Ca, Nb, Th, V, Si, Ti, Zr). ERFLING, H. D. *Ann. Phys., Lpz.*, 41, 6, *pp.* 467–475, 1942.—The linear coeff. of expansion, β, of Ca, Nb, Th and V, are determined betw. + 40° and − 215°C. [see Abstr. 1274 (1939)]. Crystallized Si shows an anomalous behaviour. Its β drops sharply from small pos. values at room temperature to neg. values at − 130°. For different forms of hexagonal Ti and Zr the β are determined and compared. The mean linear β of Ti is most probably that of the polycrystalline material, of which the drop would correspond to a Θ-value of 400–430. The γ-values of these elements are calculated and summarized in a table. H. G. S.

385 536.413 : 548.74 = 3

Thermal lattice expansion and macroscopic expansion of alkali-halide crystals prepared from the melt. GOTT, A. *Ann. Phys., Lpz.*, 41, 7–8, *pp.* 520–536, 1942.—Accurate determinations of the two expansions are made for crystals of Al, LiF, KI and KBr. The Debye–Scherrer method is used for the lattice expansion and an optical interferometer for the macroscopic method. In the case of Al the two expansions give results which are in agreement. With LiF, KI and KBr the values of the lattice expansion are throughout smaller than those of the macroscopic, the differences amounting to about 9%, 14% and 3%. The observed difference can be explained according to Schottky by the increasing disorder of the alkali halide crystals with rising temperature and by macroscopic structure faults. Proposals are made for deciding between these two possible explanations. H. G. S.

386 536.462

Influence of water vapour on flame-gas temperatures. DAVID, W. T., AND MANN, J. *Nature, Lond.*, 150, *pp.* 521–522, *Oct.* 31, 1942.

See Abstr. 514 536.495 : 666.1

See Abstr. 345 536.581.2 : 526.7

387 536.633

The specific-heat equations for carbon dioxide, carbon monoxide, steam, hydrogen, and oxygen and the free-energy equation for the water-gas reaction. THOMPSON, M. DEK. *Trans. Electrochem. Soc.*, 82, *Prepr. No.* 8, *Oct.*, 1942.—The least-square solutions for the sp. ht. equations are worked out for forms $C(p) = a + bT + cT^2$, $C(p) = a + bT + cT^{-2}$, and $C(p) = a + bT + cT^{-\frac{1}{2}}$, and the sums of the squares of the deviations of $C(p)$, calculated by each equation from the experimental values, are compared. For the temperature range of 300° to 3 000° or 3 500°K. the T^2 equation is the best for CO and steam, the T^{-2} equation is the best for H_2, the $T^{-\frac{1}{2}}$ equation is the best for CO_2 and for O_2. The equation for $\Delta G°$ of the water-gas reaction is established and the values of log K, computed by this equation, are compared with the values obtained directly from spectroscopic observations. E. R. A.

388 536.65 : 536.7 = 3

Molar and transition heats, melting and evaporation heats, moment of inertia and entropy of germanium hydride GeH_4. CLUSIUS, K., AND FABER, G. *Z. phys. Chem. B*, 51, *pp.* 352–370, *July*, 1942.—The preparation of GeH_4 is described. The m.p. precision [see Abstr. 2672 (1941)] is 24 000. It has 3 solid phases, the ranges of which are separated by transition points with hysteresis at 62·9°, 73·2° and 76·55°K. The heats of transition, melting and evaporation, were measured. The 2 solid phases existing at lower temperatures exhibit strong double refraction, in contrast to the solid phase existing between 76°K. and the m.p. The m. of i. as derived from the atom distances in CCl_4 is used for calculating the statistical and caloric entropies. The results agree with Nernst's theorem. R. N.

389 536.658 : 661.713 = 3

The sorption curve of isotropic cellulose. (Also: Preparation of completely isotropic cellulose threads.) HERMANS, P. H. *Kolloid Z.*, 97, *pp.* 326–328, *Dec.*, 1941.—The preparation of dry isotropic cellulose threads is described. The method consists in tension-free drying of short threads, swelling and repeated drying. With these threads the sorption isotherm was determined [see Abstr. 2539, 2549 (1940)]. R. N.

See Abstr. 363 536.7 : 532.77 = 3

See Abstr. 388 536.7 : 536.65 = 3

390 536.76

Thermodynamical notes. WILSON, W. *Phil. Mag.*, 33, *pp.* 831–841, *Nov.*, 1942.—A critical review of the development of fundamental concepts, from Carnot to Planck.

ELECTRICITY. MAGNETISM

391 537.12

Measurement of electronic charge. LABY, T. H. *Nature, Lond.*, 150, *pp.* 648–649, *Dec.* 5, 1942.—Describes a modified oil-drop method of measurement.

392 537.226 : 547.96

Proteins: dielectric measurements. ONCLEY, J. L. *Chem. Rev.*, 30, *pp.* 433–450, 1942. *Abstr. in J. Text. Inst., Manchr*, 33, *A*471, *Oct.*, 1942.—The dielectric behaviour of a solute of long relaxation time in a solvent of shorter relaxation time is discussed. Procedures for measurement of dielectric const. and conductance are outlined, and the effect of polarization is discussed. E. R. A.

393 537.226.1 : 539.133

Validity of the Clausius–Mosotti formula. BROWN, G. B. *Nature, Lond.*, 150, *pp.* 661–662, *Dec.* 5, 1942.

394 537.312.6

The e.m.f. of thermal fluctuations in resistances. SURDIN, M. *Nature, Lond.*, 150, *p.* 550, *Nov.* 7, 1942.

395 537.312.62 : 538.632 = 3

Supraconducting compounds with extremely high discontinuity temperatures (NbH and NbN). ASCHERMANN, G., FRIEDRICH, E., JUSTI, E., AND KRAMER, J. *Phys. Z.*, 42, 21–22, *pp.* 349–360, 1941.—Two new supraconductors NbH and NbN are reported. The former is supraconducting in the temperature range of liquid H_2, the latter above the b.p. of H_2 in the temperature range of Ne($T > 23°$ abs.). The investigation comprises chemical and X-ray analyses, tests on the transition conducting $\rightleftharpoons$ supraconducting as function of the temperature at $H = 0$ and on the effect on the transition of current strength and external magnetic fields, steady-current tests and Hall-effect

neasurements. The results indicate that these compounds behave more like semi-conductors. Their lectrical features depend markedly on minute ifferences in impurity and thermal history. In ddition, there is the possibility of the co-existence f both metallic conduction and semi-conduction. Nb$_2$N, NbO, Nb$_2$O$_3$, Nb$_2$O$_5$, NbB, TaN, Ta$_2$N and aH are not supraconducting down to 9·5° abs. -ray examination of their crystal structure is also ncluded. H. G. S.

396 537.525.5 = 3

The stabilization of the controlled vacuum arc and he arc constants. SCHUMANN, W. O. *Arch. Elektrotechn.*, 36, *pp.* 362–377, *June* 30, 1942.—An analytical nvestigation of the stable and labile conditions for arious circuit connections. E. R. A.

397 537.525.5 = 3

Stability of the controlled mercury arc. FETZ, H. *Arch. Elektrotechn.*, 36, *pp.* 378–381, *June* 30, 1942.—f a mercury arc at low v.p. is controlled by a sieve-ype grid, extinction occurs at voltages as low as 60 o 80 V, on account of the instability of the full-current circuit. The relationship betw. the instability nd the fundamental processes of the arc are discussed, and it is shown that the discharge can be tabilized by a direct feed-back. E. R. A.

398 537.531 : 535.3

Temperature variation of diffuse scattering of X-rays y crystals. BORN, M., AND LONSDALE, K. *Nature, Lond.*, 150, *p.* 490, *Oct.* 24, 1942.

399 537.531 : 535.4

Connection between the kinematic and dynamical heories of X-ray diffraction. EKSTEIN, H. *Phys. Rev.*, 62, *pp.* 255–261, *Sept.* 1 *and* 15, 1942.—It is shown that both theories are deducible from limiting cases of a general integral equation.

400 537.531 : 535.4

The diffraction of X-rays by argon in the liquid, vapour and critical regions. EISENSTEIN, A., AND GINGRICH, N. S. *Phys. Rev.*, 62, *pp.* 261–270, *Sept.* 1 *and* 15, 1942.—The patterns for A of high density show sharp max. while those of low density show less pronounced max. or none at all. There is considerable small-angle scattering in patterns for A near the saturated-vapour curve and at moderate or high pressures and temperatures. At higher pressure and temperature along the saturated-vapour curve, the liquid structure gradually becomes less pronounced, and the structure of liquid and vapour near the crit. p. are similar in nature.

401 537.533.71 : 548.74

Electron reflections in MgO crystals with the electron microscope. HEIDENREICH, R. D. *Phys. Rev.*, 62, *pp.* 291–292, *Sept.* 1 *and* 15, 1942.—[Abstr. 2736 (1942)]. Corresp.

402 537.533.72 : 539.211

Electron-microscope study of surface structure. HEIDENREICH, R. D., AND PECK, V. G. *Phys. Rev.*, 62, *pp.* 292–293, *Sept.* 1 *and* 15, 1942.

403 537.533.8 : 537.561

Ionization of argon and neon by electron impact. STEVENSON, D. P., AND HIPPLE, J. A. *Phys. Rev.*, 62, *pp.* 237–240, *Sept.* 1 *and* 15, 1942.—The ionization efficiency curve for singly charged A has at least 1 inflection. The rel. probabilities of forming singly and double charged A and Ne are tabulated.

404 537.534.74

Proton-proton interaction and Yukawa particle. KAR, K. C. *Indian J. Phys.*, 16, *pp.* 187–195, *June*, 1942.—A rigorous formula is derived for proton-proton scattering, taking the interaction potential to be of Yukawa type, $V(r) = Ae^{-\alpha r}/r$. The fitting values of A and α give the values of the short-range charge and mass of the neutretto. The charge and mass are the same as those of the mesotron previously determined by Heitler from the binding energy of the deuteron.

405 537.534.8

Short-range alpha-particles from fluorine bombarded with protons. BECKER, R. A., FOWLER, W. A., AND LAURITSEN, C. C. *Phys. Rev.*, 62, *pp.* 186–196, *Sept.* 1 *and* 15, 1942.—The Q's of particles obtained at 334, 867, 927 and 1 363 ekV, were identical, and have the value 1·81 ± 0·04 eMV. The Q of the low-energy α-particles obtained at the 1 220 ekV resonance was 1·93 ± 0·07 eMV. The two values thus yield an energy separation of 0·12 ± 0·08 eMV for the corresp. states of O^{16}. At least 1 of the 2 resonances in the neighbourhood of 900 ekV must yield short-range α-particles whose angular distribution is not spherically symmetric.

See Abstr. 406, 407 537.534.8 : 537.562 = 3

See Abstr. 403 537.561 : 537.533.8

406 537.562 : 537.534.8 = 3

Results of an investigation by H. Meyer on the ionization of H_2 and D_2 by He and by Ne canal rays. JOOS, G. *Ann. Phys., Lpz.*, 41, 6, *pp.* 426–434, 1942.—He and Ne canal rays are shot into H_2 and D_2 and the rel. difference in the total ionization measured with a canal-ray apparatus. If the difference were due to impulse transfer [Abstr. 4626 (1938)], the ionization in H_2 should be $>$ that in D_2. The reverse is the case. The difference in the ionization, therefore, depends on actual differences in the effective cross-section of H_2 and D_2. With approx. equal impulse of the colliding particles the He and Ne curves show a clear max., which is absent in the H+ and D+ curves. H. G. S.

407 537.562 : 537.534.8 = 3

On the ionization of ortho- and para-hydrogen by proton and deuteron canal rays. JUSUF, M. *Ann. Phys., Lpz.*, 41, 6, *pp.* 435–442, 1942.—Normal hydrogen and para-hydrogen are each bombarded with H+ as well as D+, and total ionization measurements made in each gas. The number of ions formed in each by H+ and D+ of equal energy is the same within the limits of error. This proves that the spin does not exercise any marked influence on the ionizing collision processes. The differences in the ionization in H_2 and D_2 [Abstr. 4626 (1938)] and the discharge cross-section are tentatively discussed. H. G. S.

408 537.591.5 : 551.521.64

Study of cosmic rays between New York and Chile. BERRY, E. B., AND HESS, V. E. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 251–256, *Sept.*, 1942.—A Compton Model-C cosmic-ray meter aboard the S.S. Santa Ana measured cosmic-ray intensities, Sept. 40 to Feb.

42. The cosmic-ray intensities were grouped into 2°·5 intervals of geomagn. lat. with the corresp. mean temperatures and temperature coeff. determined. The variation of intensity of ionization with geomagn. lat. was plotted, showing a latitude effect of 8·3%. A longitude effect of 1·5% betw. geogr. long. 75° W. and 145° W. was found. The curve of temperature coeff. was symmetrical about 23° N. geomagn. lat. Variations during the magnetic storm of March 1, 1942, are plotted.

409 538.12 : 621.318.33.042.4

The design of pole pieces of electromagnets and the forces acting on small bodies placed in their magnetic fields. DAVY, N. *Phil. Mag.*, 33, *pp.* 575–593, *Aug.*, 1942.—[Abstr. 341 B (1943)].

See Abstr. 395 538.632 : 537.312.62 = 3

MOLECULAR AND ATOMIC PHYSICS

410 539.13

Structure of the electronic bands of the OD molecule. V. Λ-doubling. SASTRY, M. G. *Indian J. Phys.*, 16, *pp.* 169–175, *June*, 1942.—The Λ-doubling in the $^2\Pi$ states of the OD molecule has been examined [see Abstr. 3827 (1931)]. Comparison of the doubling in OH and OD molecules has confirmed that it is smaller for OD than for OH.

See Abstr. 393 539.133 : 537.226.1

411 539.152.2

Electric quadrupole moments of light and heavy nuclei. WELLES, S. B. *Phys. Rev.*, 62, *pp.* 197–203, *Sept.* 1 *and* 15, 1942.—Under the assumption that the asymmetrical nuclear charge distribution is due to a single proton, a general expression for the electric quadrupole moment as a function of nuclear spin is obtained. If all allowed pairs of values of the orbital angular momentum of the proton and of the core occur with equal probability, for heavy nuclei, the quadrupole moment is neg. and the value increases negatively as the nuclear spin increases. The calculation for light nuclei shows that the addition of a proton to a nucleus whose Q was originally zero produces a neg. quadrupole moment.

412 539.154

A precision determination of *h/e* by means of the short-wavelength limit of the continuous X-ray spectrum at 20 kV. PANOFSKY, W. K. H., GREEN, A. E. S., AND DUMOND, J. W. M. *Phys. Rev.*, 62, *pp.* 214–228, *Sept.* 1 *and* 15, 1942.—The accuracy of the experiment is improved by (1) large primary X-ray intensity, (2) the use of a high-resolving-power double-crystal spectrometer, (3) reduction in background and improvement in the sharpness of the limit by the use of balanced filters, (4) improved accuracy in voltage measurements, and (5) cleaning the target in vacuum. The sources of error both in the measurements and the interpretation of the data are discussed.

See Abstr. 475 539.16 : 550.4

413 539.16.08

Cloud-chamber study of collision electrons in equilibrium with mesons. SEREN, L. *Phys. Rev.*, 62, *pp.* 204–214, *Sept.* 1 *and* 15, 1942.—A 30 cm. counter-controlled Wilson cloud chamber contained a W plate of 3·81 cm. thickness. A block of Pb either 2·54 or 7·62 cm. placed above the cloud chamber enabled a distinction to be made between mesons and electron showers. 601 meson tracks were observed (no magnetic field), 497 of which traversed the W plate. From these, the percentage of fast collision electrons in equilibrium with mesons in W and Pb was found to be 10·5% and 8% respectively. 143 collision electrons with energy range from 13 ekV to 175 ekV were produced by meson tracks in the gas and indicated a $1/E^2$ differential spectrum.

414 539.16.08 = 3

A portable cloud chamber for demonstration purposes. KUNZE, P. *Phys. Z.*, 42, 23–24, *pp.* 405–409, 1941.—A detailed and illustrated description is given of a portable, self-contained cloud chamber with which traces of α- and β-rays can be demonstrated, and the principle of operation is explained. No auxiliary, external apparatus are required. It can be connected directly to d.c. mains. With a.c. a dry rectifier is used. H. G. S.

415 539.16.08 = 3

Determination of surface and measurement of diffusion by radioactive rare gases. (Practice and quantitative applications of the emanation method.) I. The practical procedure of the measurements. ZIMENS, K. E. *Z. phys. Chem. A*, 191, *pp.* 1–53, *July*, 1942.—The method forms part of the wider field of emanation methods and their applications to measurements of adsorption, density, penetrability, etc. The paper deals with the making of the preparations, the incorporation of the radioactive substance into the substance to be investigated, with emanation power, its measurement and relation to temperature. The apparatus is described and results discussed. The use of artificially activated rare gases is described, and results of measurements are given. A bibliography of 91 publications is given. R. N.

416 539.162

Nuclear excitations resulting from radioactive decay. PLESSET, E. H. *Phys. Rev.*, 62, *pp.* 181–186, *Sept.* 1 *and* 15, 1942.—The radiations emitted by several radioactive nuclei have been investigated with a permanent β-ray magnet spectrograph. Four transitions result from the decay of Co^{57}. No internally converted radiation is emitted by Zn^{65} in the region 20–300 ekV. A complicated spectrum is emitted by the products of deuteron bombardment of Au, which has been only partially resolved.

417 539.163.2

Beta-ray spectra of arsenic, rubidium and krypton. WEIL, G. L. *Phys. Rev.*, 62, *pp.* 229–236, *Sept.* 1 *and* 15, 1942.—Cloud-chamber measurements are described in which the β-rays emitted by As^{76} ($T = 27$ hr.), Kr^{88}, $\geqslant 90$ ($T = 3$ hr.), and Rb^{88}, $\geqslant 90$ ($T = 18$ min.), were investigated. The Kr and Rb activities were separated from U fission products. The upper energy limit of the disintegration electrons from As^{76} is 2·71 eMV. A Fermi plot yields an extrapolated end point of 2·78 eMV. A K-U plot analyses into components with extrapolated end points of 0·97 eMV and 3·32 eMV. The decay of As^{76} has a ½-life of 26·8 hr. The β-rays from the active Rb have an upper energy limit at 5·1 eMV. Although a Fermi plot analyses into 2 components with extrapolated end points at 2·5 eMV and 5·0 eMV, a K-U plot indicates a single group with extra-

olated end point at 5·8 eMV. The possible instability of the Rb decay product, a Sr isotope, is discussed. A measurement of the ½-life of the Rb activity yields $T = 17·5$ min. The measurement and K-U analysis of the complex spectrum due to Kr and Rb disintegrations yields an extrapolated upper energy limit of 1·5 eMV for the β-rays emitted by Kr^{88}, ≥ 90. All the β-transitions involved are of the "forbidden" type.

418 539.164.9 + 539.166.9 + 539.185.9] : 633.4

The effect of ionizing radiations on the broad-bean root. IV. The lethal effect of α-radiations. GRAY, L. H., AND READ, J. *Brit. J. Radiol.*, 15, *pp.* 320–336, *Nov.*, 1942.—Continues previous reports [Abstr. 1346 (1942)]. The paper treats the subject mathematically. Physical investigations are detailed. The entry of radon into root tips is approx. exponential with equilibrium in 2 min. after immersion. At equilibrium, radon conc. in the root tip and surrounding solution is the same. Atoms of active deposit are unable to penetrate the root or leave it, although there is a tendency to concentrate on the surface of the root. At points out of reach of the α-particles from the surface accumulation of the active deposit, the dose is related to the solution radon conc. by a formula. The mean lethal dose of α-radiation on the broad-bean root is $72·3 \pm 2·7$ energy units. On the basis of ionization per unit vol. of tissue, α-radiation is equal in efficiency to neutron radiation and 9 times as eff. as γ-radiation in killing the bean root. B. J. L.

See Abstr. 418 539.166.9 + 539.185.9 + 539.164.9] : 633.4

See Abstr. 451 539.181 : 535.683 : 548

419 539.185.7 = 3

Absorption of C-neutrons in rare earths. RIEZLER, W. *Ann. Phys., Lpz.*, 41, 6, *pp.* 476–484, 1942.—The effective cross-sections to slow neutrons are measured of La, Ce, Pr, Nd, Sm, Eu, Gd, Dy, Ho, Er, Tu, Yb, Cp and H_2O. The results are discussed and embodied in a table, which includes the compounds used of the elements. [See also Abstr. 3098 (1942)]. H. G. S.

See Abstr. 418 539.185.9 + 539.166.9 + 539.164.9] : 633.4

420 539.185.9 : 577.3 = 3

Ionization measurements on fast neutrons. ZIMMER, K. G. *Phys. Z.*, 42, 21–22, *pp.* 360–365, 1941.—The principles and experimental proof of a method of measuring the ionization produced in biological tissue, or other hydrogenous matter, by fast neutrons, using small, air-filled Aerion ionization chambers [Abstr. 3414 (1938)]. H. G. S.

See Abstr. 402 539.211 : 537.533.72

421 539.214 : 541.182.5 = 3

On the high ductility of cellulose gels. HERMANS, P. H., AND PLATZEK, P. *Kolloid Z.*, 97, *pp.* 329–335, *Dec.*, 1941.—[See Abstr. 1403 (1942)]. It is shown by experiment that the max. ductility of isotropic cellulose threads [see Abstr. 389 (1943)] increases with decreasing deg. of swelling to a max. value and then decreases again. This agrees with theory. If the deg. of ductility is ref. to the dry state its max. value remains const. The double refraction of the stretched threads and the changes in volume were determined. R. N.

See Abstr. 357 539.215 : 531.73

422 539.215 : 548 = 3

The disperse structure of solid systems and its thermodynamical foundation. BALAREW, D. *Kolloid Z.*, 96, *pp.* 19–23, *July*, and 97, *pp.* 300–304, *Dec.*, 1941.—Further experimental support is adduced for the view [Abstr. 1657 (1942)] that the disperse structure of solid systems is based on thermodynamical foundations and that a close relation exists between colloidal and crystal systems. The functional relation between v.p. and size of grain is shown to have a min. at about 1/10 of the size of KCl crystals. [See Abstr. 305 (1943)]. R. N.

423 539.216.1

Scaliness of animal fibres. CHAMBERLAIN, N. H., AND SPEAKMAN, J. B. *Nature, Lond.*, 150, *p.* 546, *Nov.* 7, 1942.

424 539.217.3 : 677

The waterproofness of fabrics permeable to air. LAWRIE, L. G. *J. Text. Inst., Manchr*, 33, *S49–S52*, *Oct.*, 1942.—Tentative Textile Standard No. 7 relating to the Bundesmann testing machine.

425 539.234 : 539.262

Ross filter foils by evaporation. CLARK, J. C., AND ESLING, R. H. *Rev. Sci. Instrum.*, 13, *pp.* 383–386, *Sept.*, 1942.—Powdered Sb was evaporated in vacuum from a heated crucible to form a deposit 0·0015 cm. thick on cellophane backing, and the foil thus prepared was balanced with a rolled tin foil. This method increases the applicability of the Ross balanced filters to X-ray measurements by adding several essentially monochromatic pass bands.

426 539.26 : 621.386.7

Industrial radiography. *Elect. Rev., Lond.*, 131, *pp.* 393–396, *Sept.* 25, 1942.—[Abstr. 412 B (1943)].

See Abstr. 425 539.262 : 539.234

ELASTICITY. STRENGTH

427 539.4.016.3 : 679.56

The influence of temperature on the mechanical properties of moulded phenolic materials. CARSWELL, T. S., TELFAIR, D., AND HASLANGER, R. U. *Proc. Amer. Soc. Test. Mater.*, 42, *Prepr. No.* 104, [10 *pp.*], 1942.—Data showing the variation of the impact, flexural and tensile strengths with temperature are given for moulded phenolic compositions containing wood flour, asbestos, macerated fabric and cord fillers and for a pure resin composition. E. R. A.

428 539.536 : 679.5

ASTM test: mar resistance of plastics. *Mod. Plast.*, 20, *pp.* 84–85, 126 *and* 128, *Sept.*, 1942.—The method is designed to measure resistance of glossy surfaces to abrasive action; since measurement of progressive optical deterioration of glossy surface is involved, such materials as moulded and laminated plastics, paint and lacquer films and plated coatings, may be evaluated. E. R. A.

429 539.536 : 679.5

Mar resistance of plastics. BOOR, L. *Proc. Amer. Soc. Test. Mater.*, 42, *Prepr. No.* 86, [15 *pp.*], 1942.—The special aspect of hardness of plastics tentatively

designated "mar resistance" was studied by means of a test in which abrasive was allowed to fall against a test surface, and the resultant lowering of gloss was evaluated with an optical glossmeter. Comparative values are given for a variety of materials, plastic and non-plastic. Data obtained by this test on a series of plastic materials by 3 co-operating laboratories are given and a comparison is made of their rel. rating by different test methods. E. R. A.

PHYSICAL CHEMISTRY

430 541.124 = 3

On the exchange of the Cl atoms of $H^{35}Cl$ with $AsCl_3$, PCl_3, $POCl_3$, CCl_4, $SiCl_4$, S_2Cl_2 and KCl. Clusius, K., and Haimerl, H. *Z. phys. Chem. B*, 51, *pp.* 347–351, *July*, 1942.—The exchange of the Cl atoms between these chlorides and the HCl consisting of 3% $H^{37}Cl$ and 97% $H^{35}Cl$ was investigated and the partial pressures, reaction velocities and mol. wt. after exchange are tabulated. Measurements were made with the balance previously described [Abstr. 291 (1943)]. With KCl the exchange is confined to the surfaces. The exchange mechanism is discussed.

R. N.

431 541.128.1

Catalysed hydrolysis of amide and peptide bonds in proteins. Steinhardt, J., and Fugitt, C. H. *J. Res. Nat. Bur. Stand., Wash.*, 29, *pp.* 315–327, *Nov.*, 1942.—The rates of hydrolysis by dilute acids of both a dissolved protein (egg albumin) and an insoluble protein (wool) depend not only on the temperature and acidity but also on the acid used. When hydrolysed at 65°C. by certain strong monobasic acids of high mol. wt., the amide and the peptide bonds are broken over 100 times as fast as when they are hydrolysed with HCl. These differences in hydrolytic effectiveness parallel differences in the affinities of the anions of the acids for protein. A further reason for attributing this effect to the anions is the attainment, with anions of high affinity, of a max. rate of amide hydrolysis at rel. low conc., stoichiometrically equivalent to the sum of the amino plus the amide groups. A mechanism which involves combination of the groups hydrolysed with H ions is proposed.

432 541.128.1 = 3

The "magnetocatalytic effect" at the hydration of CO_2 and CO with nickel. Spingler, H., and Reinhard, O. *Z. phys. Chem. A*, 190, *pp.* 331–340, *June*, 1942.—The effect consists in an unstable catalytic activity of Ni in passing through the Curie-interval. The effect is shown to exist at the hydration of CO but not at that of CO_2. R. N.

433 541.132 : 621.357.5

Chromic acid anodic baths. Hartford, W. H. *Industr. Engng Chem.*, 34, *pp.* 920–924, *Aug.*, 1942.—[Abstr. 369 B (1942)].

See Abstr. 359 541.182.4 : 532.13 = 3

See Abstr. 360 541.182.5 : 532.13 = 3

See Abstr. 421 541.182.5 : 539.214 = 3

434 541.571

The electron diffraction investigation of propargyl chloride, bromide and iodide. Pauling, L., Gordy, W., and Saylor, J. H. *J. Amer. Chem. Soc.*, 64, *pp.* 1753–1756, *Aug.*, 1942.—The C–C triple-bond and single-bond distances are the same in these molecules as in methylacetylene, and the C–halogen bond distances are somewhat larger than normal.

435 541.6

The structure of substituted ethylenes and their isomerization polymerization and "peroxide addition" reactions. Harman, R. A., and Eyring, H. *J. Chem. Phys.*, 10, *p.* 557, *Aug.*, 1942.

436 541.621

Isomerization of β-carotene. Isolation of a stereoisomer with increased adsorption affinity. Polgár, A., and Zechmeister, L. *J. Amer. Chem. Soc.*, 64, *pp.* 1856–1861, *Aug.*, 1942.—The isomerization of β-carotene was studied, under the influence of refluxing, iodine catalysis, HCl catalysis and by melting the crystals. The chromatograms showed a number of pigments, 9 or 10 of which were stereoisomers of β-carotene. Some of them are very labile. On addition of iodine they all yield a preponderant quantity of β-carotene and minor stereoisomers. One of the new isomers, "neo-β-carotene U," has been crystallized in a yield of 17% of the starting material. It is adsorbed above β-carotene.

437 541.63

The basis of stereochemistry. Mills, W. H. *J. Chem. Soc.*, *pp.* 457–466, *July*, 1942.—A lecture survey giving a semi-mathematical account of the progress in the understanding of the relations between atomic structure and valency configuration from the wave nature of the electron. By analogy of simple considerations of the characteristics of the vibrations of mechanical systems, the origin of directed valency and the causes which determine the valency configuration of the simpler atoms are described. N. M. B.

438 541.63

The long spacing in rubber. Schallamach, A. *Trans. Faraday Soc.*, 38, *pp.* 376–380; *Disc.*, 380–387, *Aug.*, 1942.

439 541.63

The stereochemistry of the rubber molecule. Bunn, C. W. *Trans. Faraday Soc.*, 38, *pp.* 372–376, *Aug.*, 1942.

440 541.64

Polymerization of drying oils. Ault, W. C., Cowan, J. C., Kass, J. P., and Jackson, J. E. *Industr. Engng Chem.*, 34, *pp.* 1120–1123, *Sept.*, 1942.—Rates of polymerization of esters of pure octadecatrienoic acids found in natural and synthetic drying oils were determined at 275°C., and the influence of geometric configuration on the rates was noted. No uniform correlation exists between the speed of drying and the speed of gelation of certain synthetic oils. A simplified interpretation of the 1,4-diene mechanism for the polymerization of the conjugated trienoic acids is presented, and possible structures are suggested to account for the properties of the polymerized products.

441 541.64 = 3

Chemistry of heat polymerization of styrene. Breitenbach, J. W., and Breitenbach, H. L. *Z. phys. Chem. A*, 190, *pp.* 361–374, *June*, 1942.—The effect of quinones, e.g. methylated *p*-benzoquinone and chloranil, on the heat polymerization of styrene is investigated. It consists in a reduction of the

locity of polymerization and of the average chain ngth. Between the quinone and the growing chain styrene a chemical reaction occurs which impedes e growth. The relation betw. reaction velocity and idation potential of the quinones is discussed. The olymerization effect appears to be due to a loosening one of the H atoms of the monostyrene. R. N.

442 541.653

The influence of lyotropic substances on the specific otation of β-levoglucosan. KATZ, J. R., AND SIBERLICH, J. *J. Phys. Chem.*, 46, *pp.* 640–641, *une*, 1942.

443 541.653

Studies on the dependence of optical rotatory power n chemical constitution. XX. Stereo-isomeric xylinomethylene-camphors. SINGH, B. K., AND BHAURI, B. *Proc. Indian Acad. Sci. A*, 16, *pp.* 62–67, *uly*, 1942.—[See Abstr. 3141 (1942)]. The rotatory ower of the *dextro*- and *laevo*-forms of xylidinomethyne camphors (*m* and *p*) are identical, and obey the mple dispersion law of Drude. The substitution of methyl group for an atom of H in the phenyl group f anilinomethylene camphor lowers its rotatory ower. The introduction of a second methyl group s in the xylidinomethylene camphors generally lowers ne rotation still further, owing to the polar effect of ne first methyl group being reinforced by that of the econd like group.

444 542.2

A laboratory temperature and humidity cabinet. DAVIS, L. H., PETRE, A. W., AND BAILEY, C. F. *ndustr. Engng Chem.* (*Analyt. Edit.*), 14, *pp.* 587–590, *uly* 15, 1942.—A laboratory cabinet is described which furnishes a circulating atmosphere of regulated emperature and humidity. Means of humidifying, rying, heating and cooling, are provided. The quilibrium moisture characteristics of 5 types of leaf obacco have been studied.

445 542.2

A temperature- and humidity-controlled dryer for a hemical engineering laboratory. SCHAFFNER, R. M., ND COULL, J. *Industr. Engng Chem.* (*Analyt. Edit.*), 4, *pp.* 590–592, *July* 15, 1942.

446 542.3

Microgasometric determination of nitrogen in blood nd saliva. SCHOLANDER, P. F. *Rev. Sci. Instrum.*, 3, *pp.* 362–364, *Aug.*, 1942.

447 542.48

Design of still heads for batch fractionation in aboratory columns. RICHARDS, A. R. *Industr. Engng Chem.* (*Analyt. Edit.*), 14, *pp.* 649–652, *Aug.* 15, 1942.—Reflux regulators for batch distillation are described in which the product is removed in the vapour phase. Possible designs are discussed with reference to glass models, and detailed designs are given for still heads of general application.

448 542.48

An oil manometer-manostat to control column hroughput. HALL, S. A., AND PALKIN, S. *Industr. Engng Chem.* (*Analyt. Edit.*), 14, *pp.* 652–654, *Aug.* 15, 1942.

449 542.67 = 3

On filtration research. III. Indirect methods of iltration research with auxiliary filtering means. BRIEGHEL-MÜLLER, A. *Kolloid Z.*, 99, *pp.* 293–301, *June*, 1942.—[See Abstr. 1969 (1942)]. A number of filtering substances were investigated with regard to their physical properties, with a view to assessing their filtering qualities. A close relation exists between average size and uniformity of grain on the one hand and the filtering properties of aqueous suspensions on the other. Some characteristic features of the filtration curves are explained by determining the sediment volume. The relations of adsorption and adhesion and their significance for the clarification processes in the manufacture of sugar are discussed. R. N.

See Abstr. 392 547.96 : 537.226

CRYSTALLOGRAPHY

450 548

The physics of the diamond. RAMAN, C. V. *Curr. Sci.*, 11, *pp.* 261–268, *July*, 1942.—Discusses a series of experiments carried out by the author and his collaborators. These include experiments on the birefringence and luminescence of diamond, and the scattering of light and X-rays. Among other things it is concluded that the results are irreconcilable with the Debye and Born theories of the solid state. J. T.

451 548 : 535.683 : 539.181

Induced colour in crystals by deuteron bombardment. CORK, J. M. *Phys. Rev.*, 62, *pp.* 80–81, *July* 1 *and* 15, 1942.

See Abstr. 422 548 : 539.215 = 3

452 548.1 : 517.512.2

A new Fourier-series technique for crystal-structure determination. BUERGER, M. J. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 281–285, *July*, 1942.—An extension of the method described previously [Abstr. 455] to the synthesis of Fourier series in crystal-structure determination. Difference diagrams may be prepared without first plotting the Patterson diagrams of the 2 crystals considered, and may be used, for example, to determine the character of solid solutions. J. T.

453 548.33 = 3

Polymorphy and miscibility in the isomorphous group: dibenzyl, stilbene, tolane and azobenzene. KOFLER, A., AND BRANBSTÄTTER, M. *Z. phys. Chem. A*, 190, *pp.* 341–360, *June*, 1942.—The miscibility types of the 6 possible binary systems of these substances are investigated and their melting diagrams are discussed. R. N.

454 548.73

Isomorphism and allotropy in compounds of the type A_2XO_4. BREDIG, M. A. *J. Phys. Chem.*, 46, *pp.* 747–764, *June*, 1942.—In the temperature range below their m.p., alkali sulphates constitute with alkali alkaline-earth phosphates a new group of isomorphous compounds A_2XO_4 of a simple hexagonal structure. The structure of the low-temperature (β-) form of $CaNaPO_4$ is identical with that of orthorhombic β-K_2SO_4, its lattice constants were derived from the powder X-ray pattern. A preliminary structure proposal is made for β-$CaKPO_4$. Besides true thermodynamic stabilization, slowness of diffusion and, therefore, of separation of one solid phase into two or more solid phases, is considered

as a controlling factor for the stabilizing effect of foreign additions in many crystal transformation phenomena occurring in chemical compounds.

455 548.73

The distribution of metallic atoms in two-component glasses. LUKESH, J. S. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 277–281, *July*, 1942.—By subtracting from the ordinates of the radial-distribution curve of a 2-component glass (e.g. soda-silica glass) those of the radial-distribution curve of one of the 2 components (e.g. silica glass), a differential curve is obtained which has max. corresp. to the interatomic distances of the metal atoms (e.g. Na). The method is applied to soda-silica glass and Na and K borate glasses. J. T.

456 548.73

Crystal structure of oxyhaemoglobin. PERUTZ, M. F. *Nature, Lond.*, 150, *pp.* 324–325, *Sept.* 12, 1942

457 548.73

Formation of a double crystal aggregate and the structure of the intermediate temperature modification of $Ni(NO_3)_2 . 6NH_3$. YÜ, S. H. *Nature, Lond.*, 150, *pp.* 347–349, *Sept.* 19, 1942.

458 548.73

Temperature diffuse diffraction maxima and crystal perfection. TEAGUE, D. S. *Phys. Rev.*, 62, *p.* 179, *Aug.* 1 *and* 15, 1942.

459 548.73 = 4

Transition in ammonium chloride observed by X-ray diffraction. DINICHERT, P. *Helv. Phys. Acta*, 15, 5, *pp.* 462–475, 1942.—The transition temperature interval is $\sim 3°$ and is characterized by the co-existence of 2 types of crystals and by the abnormal expansion of these types. In addition, as soon as the second form appears, the untransformed crystal expands differently, and the expansion of the α and β lattices depends on the direction of the transition. An explanation involving the assumption of 6 types of lattice: α, $\alpha\alpha$, $\beta\alpha$, β, $\beta\beta$ and $\alpha\beta$, is described, the intermediate forms being attributed to intermediate states between complete rotation of the NH_4 group and its oscillations around certain axes. An explanation of the hysteresis in the transition region is discussed. N. M. B.

460 548.74

On etching-patterns on Al-crystal surfaces. I. MAHL, H., AND STRANSKI, I. N. *Z. phys. Chem. B*, 51, *pp.* 319–346, *July*, 1942.—Etching-patterns of Al-crystals of different deg. of purity, with different etching acids and with electrolytic etching, were examined with the electron microscope [Abstr. 326 B (1942)]. The investigations were made on the oxide film severed from the metal by means of a $HgCl_2$ solution. The etching relief is generally cubic, but with purest Al pseudo-pyramidal surfaces are observed, consisting of fine steps formed by cubic surfaces. A theoretical explanation is given, according to which the special character of the patterns is due to the oxide layer covering the crystal surface. R. N.

See Abstr. 385 548.74 : 536.413 = 3

See Abstr. 401 548.74 : 537.533.71

GEOPHYSICS

461 550.312

The analytic basis of gravity interpretation. HUGHES, D. S. *Geophysics*, 7, *pp.* 169–178, *April*, 1942.—Using hypothetical structures comprising single and double blocks, a surface-gravity profile is derived. Using these values as an observed gravity profile, the continuation method is applied to compute the gravity at intermediate depths. Comparing these computed values with the actual (directly computed) gravity profile at these depth-planes, the resolving power of the continuation method is demonstrated.

462 550.34(54)

Seismological features of the Satpura earthquake of the 14th March, 1938. MUKHERJEE, S. M. *Proc. Indian Acad. Sci. A*, 16, *pp.* 167–175, *Sept.*, 1942.—The shock was felt over about 400 000 sq. miles. The position of the epicentre is calculated as 21° 32′ N. and 75° 50′ E. and the time of origin as $0^h\ 48^m\ 30^s$ G.M.T. The depth of focus is calculated as 40 km. The magnitude of the shock was about 5·5 and energy about 10^{19} ergs. Velocities of the various crustal waves are given.

463 550.341

Curved-path methods applied to verticals and to wide-shot spreads. MOTT-SMITH, M. *Geophysics*, 7, *pp.* 133–141, *April*, 1942.—The ray-path/wave-front chart and similar methods used for vertical shots are briefly described, and the possibility and the advantages of applying the linear time law is pointed out. A short method of fitting the linear depth law to the observed velocity is described. The possibility of extending any method applicable to verticals to wide-shot spreads is shown, and a method of correcting straight path dips for curvature in the case of verticals is pointed out.

464 550.341

A note on a rationalized velocity/depth equation. SPARKS, N. R. *Geophysics*, 7, *pp.* 142–143, *April*, 1942.—An average velocity/depth equation of the form $V = V_0(1 + aZ)/(1 + bZ)$ is suggested and its properties rel. to the generalized velocity variation within the sedimentary column are discussed.

465 550.384 : 523.746

Solar and magnetic data, April to June, 1942, Mt. Wilson Observatory. NICHOLSON, S. B., AND MULDERS, E. S. *Terr. Magn. Atmos. Elect.*, 47, *p.* 269, *Sept.*, 1942.

466 550.384 : 550.389

The reduction of magnetic observations to epoch. I. VESTINE, E. H. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 97–113, *June*, 1942.—The problem of removing the effects of undesired geomagnetic variations from the field measurements of magnetic surveys is considered, particular attention being devoted to the removal of the perturbations existing in H after magnetic storms. This correction from mean of day to mean of year is of importance in constructing magnetic charts, and it is shown that valuable corrections can be obtained by using data from only a few observatories even though these are at considerable distances from the field-station. A. HU.

467 550.384 : 551.594.13

Geomagnetic bays, their frequency and current-systems. SILSBEE, H. C., AND VESTINE, E. H. *Terr.*

agn. Atmos. Elect., 47, *pp.* 195–208, *Sept.*, 1942.—lecting bays by a definition which is biased in favour simple isolated examples of the phenomenon, the thors examine the diurnal and annual variations frequency of occurrence of bays for 4 zones of omagnetic lat. The results agree with previous idings for low and middle lat., but the values for gh lat. yield new characteristics which are strikingly fferent. Heights of the polar part of the electric rrent system of bays are estimated in 2 different ays: both agree in a location near the E-region. n average current system is deduced which re-mbles that for the diurnally varying component of orms, though distorted in polar regions. A. HU.

468 550.384.5(68)

Oscillations and pulsations recorded during the year 941, at the magnetic observatory, Hermanus, South frica. OGG, A. *Terr. Magn. Atmos. Elect.*, 47, *p.* 227–233, *Sept.*, 1942.—The oscillations and ulsations, discussed in this report, are those which ccur on days which are otherwise quiet.

469 550.385

The 27-day recurrence tendency of magnetic storms. ENKOVA, N. P. *Terr. Magn. Atmos. Elect.*, 47, *p.* 147–153, *June*, 1942.—The Sloutzk catalogue of 073 magnetic storms in the period 1878–1939 examined with the view of establishing connections etween recurrent storms and the rotation of the un. The tendency to recur after 27 days, large vith most storms, decreases with very great storms nd increases again with storms of exceptional in-ensity. In a storm sequence the max. intensity is sually reached with the second appearance, the ctivity weakening with later recurrences. The ten-dency to recur is most pronounced during years of decrease of solar activity. There is no variation in he length of the interval between recurrences during he 11-year cycle. A. HU.

470 550.385

Principal magnetic storms, October to December, 1941, and March to June, 1942. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 270–274, *Sept.*, 1942.—Data from Tucson, Huancayo, Alibag, Watheroo and Hermanus.

471 550.385 : 551.594.51

On Alfvén's theory of magnetic storms and of the aurora. COWLING, T. G. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 209–214, *Sept.*, 1942.—Alfvén's theory, in which charged particles, repelled diamagnetically from the Sun, are separated into electrons and ions on reaching the Earth and are then discharged to the geomagnetic poles, is criticized. It is shown that diamagnetic repulsion prevents the particles from reaching the Earth's atmosphere, and that electro-static forces prevent more than a slight separation of ions from electrons. A stream of ionized particles can reach the Earth only if either the particles are of large energy or the stream is so dense that the leading particles shield the body of the stream from diamag-netic repulsion. A. HU.

472 550.385(489)

Geomagnetic giant pulsations of March 1, 1942. LA COUR, D. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 265–266, *Sept.*, 1942.

473 550.385(98)

Characteristics of magnetic storminess at Gjöahavn, 1904. WASSERFALL, K. F. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 235–241, *Sept.*, 1942.

474 550.389

American URSI broadcasts of cosmic data, giving American magnetic character-figure, C_A, three-hour-range indices, K, and mean K-indices, K_A, for April to June, 1942. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 257–260, *Sept.*, 1942.

See Abstr. 466 550.389 : 550.384

475 550.4 : 539.16

A theory of the distribution of radioactivity in marine sedimentary rocks. WEAVER, P. *Geophysics*, 7, *pp.* 192–198, *April*, 1942.—Gamma-ray measure-ments of marine sedimentary rocks indicate that the slower the rate of deposition the greater the radio-activity. The most recent measurements of the radio-activity of sea water suggest an increase with depth, which indicates a very slow settling of small particles.

476 550.8(764)

The Crosbyton anomaly, south-eastern Crosby County, Texas. MCLEMORE, E. W., WEAVER, P., AND BARTON, D. C. *Geophysics*, 7, *pp.* 179–191, *April*, 1942.—Interpretation of the most probable structure producing the slightly sub-circular anomaly at Crosbyton, as mapped by the pendulum, torsion balance, magnetometer and dip needle.

477 550.838

Graphical and mechanical determination of the true dip from magnetically orientatable cores taken in crooked holes. HOBSON, G. D. *J. Inst. Petrol.*, 28, *pp.* 274–280, *Nov.*, 1942.

478 551.3.051

Errors in measuring stratigraphic thickness. SECRIST, M. H. *Amer. J. Sci.*, 240, *pp.* 627–632, *Sept.*, 1942.—By the use of actual measurements and computations, sources of error arising from the use of short-cut methods in measuring stratigraphic thickness resulting from field (or map) traverses are revealed. A means of avoiding such errors is given.

479 551.464

The processes determining the concentration of oxygen, phosphate and other organic derivatives within the depths of the Atlantic Ocean. REDFIELD, A. C. *Pap. Phys. Oceanogr. Met.*, 9, [22 *pp.*], *Sept.*, 1942.—A large part of the phosphate content and apparent oxygen utilization observed in the deeper layers of the N. and S. Atlantic may be attributed to characteristics acquired by the water when it was rel. near the surface in higher lat. In the tropical Atlantic a large part of the observed phosphate concentration and oxygen deficit must be attributed to the decomposition of organisms which have sunk from the sea surface to depths of 600–800 m.

480 551.5 : 523.78

Eclipse meteorology, with special reference to the total solar eclipse of Aug. 31, 1932. BROOKS, C. F., FERGUSSON, S. P., KIMBALL, H. H., HAURWITZ, B., BROOKS, E. S., NAMIAS, J., PIERCE, C. H., WEXLER, H., AND BROOKS, E. M. *Harv. Met. Stud., No.* 5, [109 *pp.*], 1941.—Meteorological data observed during 8 eclipses are collected, special attention being paid to the total eclipse of 1932, in which the path of totality

lay across a well-populated region of N. America. The radiant energy received during an eclipse is found to be roughly proportional to the unobscured area of the sun. For a decline in radiation of 0·1 cal./cm.² min. the air temperature at the surface of the earth decreases 0·4°C. as compared with 0·6°C. for an equal fall of radiation during the afternoon at the same time of year. The temperature effect is recognizable as far as the zone of 40% obscuration; it is markedly decreased by cloudiness, humidity and altitude. In the 1932 eclipse a dip of 0·3 mb. pressure occurred 20 min. after totality: this is of the magnitude expected theoretically. Characteristic wind changes are explicable by the decrease in daytime convection resulting from eclipse cooling. Changes in humidity and cloud conditions are discussed. Shadow-band observations indicate that the bands are parallel to the solar crescent and that they move with the wind that carries the optically disturbed layer in which they originate. The evidence from cloud motions, pilot-balloon runs and aircraft observations gives little support to the existence of any eclipse cyclone. Suggestions are made for future observations. A. HU.

481 551.508.41

A capillary mercurial barometer. BOYS, C. V. *J. Sci. Instrum.*, 19, *p.* 168, *Nov.*, 1942.

482 551.508.71(09)

The early history of hygrometry, and the controversy between de Saussure and de Luc. MIDDLETON, W. E. K. *Quart. J. Roy. Met. Soc.*, 68, *pp.* 247–259; *Disc.*, 259–261, *Oct.*, 1942.—An account of the early development of hygrometers and hygrometry is presented from the time of Leonardo da Vinci up to about the year 1800.

483 551.510.535 = 3

Relation between the light of the night sky and the ionosphere. HECHTEL, R. *Hochfrequenztechn. u. Elektroakust.*, 56, *pp.* 129–136, *May*, 1940. *Bull. Ass. Suisse Élect.*, 33, *pp.* 351–352, *June* 17, 1942.—Observations extending over several months of 1939 and in the following Dec. and Jan. were made to see whether any relation exists betw. the intensity of the light of the night sky and the max. electron concentration in the F_2-layer. From the curves showing the changes in these quantities the agreement is not obvious, but calculation of the correlation coeff. shows a connection betw. the two quantities. Whether a relation exists betw. the light of the night sky and the electron concentration in the abnormal E-layer is uncertain. A considerable part of the light of the night sky is emitted in the F_2-layer. Two reasons are given for the belief that the amplitude of the intensity variations of the light of the night sky is < that of the max. electron concentration. A. W.

484 551.511

Subsidence and ascent of air as determined by means of the wet-bulb potential temperature. LONGLEY, R. W. *Quart. J. Roy. Met. Soc.*, 68, *pp.* 263–276; *Disc.*, 276–277, *Oct.*, 1942.—The paper contains: a description of the use of the wet-bulb potential temperature for determining changes in level of air in situations when all levels of the original air column have not the same trajectory; a derivation of the amount of subsidence which takes place in air moving off the ridge of a high, amounting at times to 1·7 km. in 24 hr. from the 3 km. level, and a demonstration of the subsidence of an inversion in the centre of a high of 300 m. in 24 hr.; a demonstration of the overrunning and uplift of a stream of warm air over another stream of colder air; some remarks on the divergence of the subsiding air as it moves off the high pressure region; a discussion of the changes in moisture content which took place in the masses of air considered.

485 551.515.1(744)

Isallobars and wind directions as indicators of the direction of movement of secondary cyclones on the Middle Atlantic Coast in winter. CONOVER, J. H. *Bull. Amer. Met. Soc.*, 22, *pp.* 276–278, *June*, 1941.—A study of the synoptic maps and local data is made for 15 coastal storms, 1938–41, with sp. regard to their effect on weather at Boston. By drawing lines of equal pressure-change from 3 hr. data, the isallobaric patterns typical of coastal secondaries are derived. Secondary cyclones producing heavy precipitation at Boston are centred in their early stages west of a line running SSE from New Jersey; those which will give only light precipitation are centred east of this line. A. HU.

486 551.515.3(62)

Frequency of dust storms in the Egyptian desert. HEYWOOD, H. *Nature, Lond.*, 150, *p.* 293, *Sept.* 5, 1942.

487 551.521

Heat transfer by infra-red radiation in the atmosphere. ELSASSER, W. M. *Harv. Met. Stud., No.* 6, [107 *pp.*], 1942.—Deals with the general theory of heat transfer in the atmosphere by monochromatic and heterochromatic radiation, without regard to the particular structure of its infra-red spectrum. The atmospheric absorption spectrum is described in detail and the connection shown betw. its structural elements (especially those due to water vapour) and the integral effects observed as a radiative heat flow. Modern methods of measuring heat radiation in the atmosphere, or in the laboratory under conditions simulating those of the atmosphere, are described and the empirical relations derived from such measurements are discussed. An atmospheric-radiation chart is appended. A. HU.

See Abstr. 408 551.521.64 : 537.591.5

488 551.524.36(414.2)

Abnormally high and low daily mean temperatures, Kilmarnock, 1902–1941. DUNBAR, W. *Quart. J. Roy. Met. Soc.*, 68, *pp.* 287–292, *Oct.*, 1942.—The thermometric records at Kilmarnock are analysed over the period 1902 to 1941 [see Abstr. 2029 (1941)]. The number of days with abnormally high and low temperatures are given for seasons, for months and for pentads, and a comparison is made with the figures obtained for Greenwich. Tables are also presented giving the dates of days with very exceptional temperatures and the departures from the average.

489 551.524.36(744)

Structure of the weather on Mount Washington. CONRAD, V. *Bull. Amer. Met. Soc.*, 22, *pp.* 297–298, *Sept.*, 1941.

490 551.553.22(261)

Two winter storms encountered by Columbus in 1493 near the Azores. BROOKS, C. F. *Bull. Amer. Met. Soc.*, 22, *pp.* 303–309, *Oct.*, 1941.—The two severe storms that overtook Columbus on the return portion of his first voyage, when examined in the light of modern frontal theory, do not appear to have been simple circular storms, but disturbances marked by well-developed fronts. The centres of both passed north of Columbus. The Feb. storm seems to have had 2 cold fronts, and the March one a very sharp cold front. Storms of both kinds have been observed in the same region in recent years.

491 551.555.1(263.5)

On the mean circulation of the atmosphere over the Caribbean. STONE, R. G. *Bull. Amer. Met. Soc.*, 23, pp. 4–16, *Jan.*, 1942.—The results of over 7 500 pilot-balloon ascents observed at San Juan in the period 1920–38 are discussed. Monthly wind resultants are given for heights up to 16 km. The seasonal change in the height of the trade-antitrade boundary is illustrated, and the bearing of the results on recent conceptions of the general tropical circulation is indicated. A steadiness index and a mass-transport index are defined and computed for various heights; isopleth diagrams showing these indices give closely accordant trade-antitrade boundaries, defined resp. as the belt of min. steadiness and as the region of min. mass transport. General characteristics of both trades and antitrades are described, and the existence of an upper trade is confirmed. Cloud observations differ from the balloon results, and possible reasons for some discrepancies are discussed. A. HU.

492 551.57 : 621.317.39

An electrical instrument for determining the dew point of gases. THORNTON, B. M. *Engng Boil. Ho. Rev.*, 56, *pp.* 66–69 *and* 89, *July*, 1942.—[Abstr. 328 B (1943)].

493 551.571 = 3

Determination of the humidity of the air by means of the temperature of evaporation of water. OSWATITSCH, K. *Phys. Z.*, 42, 19–20, *pp.* 343–347, 1941.—The relation between the humidity of the air and the temperature of evaporation of a small drop of water (1 mm. dia.) in still air is established. The temperature of the drop and that of the air correspond, respectively, to the wet-bulb and dry-bulb thermometer temperatures of a psychrometer. The former is measured by a Cu-constantan thermo-element to which the drop is held by a fine thread round the junction; for the latter the reading of the dry-bulb thermometer of the psychrometer is taken. The corresp. saturation pressures of the water vapour are taken from a table. H. G. S.

494 551.571.35

Exceptionally dry air. READ, R. S. *Quart. J. Roy. Met. Soc.*, 68, *pp.* 294–296, *Oct.*, 1942.

495 551.571.35(422.1)

Abnormally dry air at Kew Observatory. DRUMMOND, A. J. *Quart. J. Roy. Met. Soc.*, 68, *pp.* 293–294, *Oct.*, 1942.

496 551.573

Evaporation from water drops and wet spherical surfaces. KARVE, C. S. *Proc. Indian Acad. Sci. A*, 16, *pp.* 103–114, *Aug.*, 1942.—A summary of previous work is given. The paper describes experiments on the evaporation from wet spheres of porous chalk in the range of Reynolds numbers 600 to 10 000, When $0 < R < 25\,000$, the rate of evaporation from spheres of different sizes and at different wind velocities can be expressed as a function of R.

497 551.574.4(422.1)

The persistence of dew. *Quart. J. Roy. Met. Soc.*, 68, *p.* 278, *Oct.*, 1942.

498 551.577.2(54)

A note on the rainfall at Madras and Bangalore. SESHACHAR, C. *Curr. Sci.*, 11, *p.* 364, *Sept.*, 1942.

499 551.577.37(41)

Notable falls of rain during intervals of a few days in Great Britain. HAWKE, E. L. *Quart. J. Roy. Met. Soc.*, 68, *pp.* 279–286, *Oct.*, 1942.

500 551.578.4

The formation of small hail and snow pellets. ARENBERG, D. L. *Bull. Amer. Met. Soc.*, 22, *pp.* 113–116, *March*, 1941.

501 551.578.4

The measurement of snowfall with shielded gauges. BROOKS, C. F. *Proc. Cent. Snow Conf.*, 1, [3 *pp.*]; 1942.

502 551.578.42(422.3)

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VARIOUS SUBJECTS

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See Abstr. 418 633.4 : [539.164.9 + 539.166.9 + 539.185.9

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